STANDARD MICROSYSTEMS CORPORATION
COMPONENT PRODUCTS DIVISION
35 Marcus Blvd., Hauppauge, NY 11788
(516) 273-3100 Fax (516) 231-6004

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# ARCNET CABLE LENGTH VS. NUMBER OF NODES FOR THE HYC9088 IN COAXIAL BUS TOPOLOGY

By: Daniel Kilcourse

# INTRODUCTION

The original ARCNET® star topology networks, those which make use of the LAND (Local Area Network Driver - HYC9068) module, are straightforward with respect to cable lengths and the number of nodes. Simply stated, the user is allowed a maximum distance of 2000 feet between any two devices containing a LAND module.

Permissible distances become somewhat of a more complicated issue when dealing with the bus topology, made possible by the HIT (High Impedance Transceiver - HYC9088) module and worse when combining the two types of modules on a single cable. This technical note addresses the coaxial cable length vs. number of nodes issue for HIT only topologies, as well as HIT/LAND topologies. Twisted Pair issues do not fall within the scope of this technical note.

# DEVICE/MODULE IDENTIFICATION

Table 1 lists SMC ARCNET products and indicates the type of module used in each product.

**Table 1**

| DEVICE | MODULE |
|---|---|
| PC110 | LAND |
| PS110 | LAND |
| Active Hub-01 | LAND (all ports) |
| Active Hub-Opt | LAND (coax ports only) |
| PC210 | HIT |
| Active Link | HIT (both ports) |
| Active Link-Opt | HIT (coax port only) |
| Active Link-Opt 2 | HIT (coax port only) |
| Twisted Pair Link | HIT (coax port only) |

# HIT ONLY TOPOLOGIES

SMC has specified that eight nodes may be connected to 1000 feet of RG62 coaxial cable. In fact, more nodes may be connected if the cable is shorter and fewer nodes are allowed if the cable is longer. A node, for the purposes of this discussion, is defined as any device containing a HIT and is connected to the cable.

A HIT will output a signal 9 dB over and above that required to drive its own receiver and insure proper signal to noise ratio for the remaining nodes. Each additional node has an insertion loss of 0.43 db and RG 62 cable has an attenuation of 0.6 dB per 100 feet at 5 MHz (5 MHz is the

3. Since the LAND provides the proper termination impedance, the terminator typically connected to the end of the cable in the bus topology must NOT be connected.

4. Use Table 2 to determine the maximum cable lengths for the number of desired nodes. In a mixed HIT/LAND environment, do NOT count devices containing LAND modules as nodes.

5. A device containing a LAND module must ALWAYS have power applied. If power is lost, the cable will no longer be terminated properly and may result in a non-functioning network.

Once, again, the HIT/LAND Bus topology is NOT recommended but is presented above for those who find it necessary to use this topology in their application.

## QUESTIONS AND ANSWERS

1. Can a HIT-type device be connected to an existing star configuration which has 2000 feet of cable and a LAND-type device at each end?

   A HIT device presents an additional .43 dB loss to the network. This is equivalent to approximately 72 feet of RG62 cable. A HIT device may be connected to a cable 1928 feet long (2000 ft. - 72 ft.) which has a LAND device on each end providing the distance between the HIT device and the furthest node is no greater than 1500 feet.

2. With respect to termination characteristics, how does the HYC9068 (LAND) differ from an HYC9088 (HIT) which is terminated externally with a 93Ω resistor?

   The HYC9068 (LAND) has a 93Ω impedance only when power is applied to the device. An HYC9068 must have power applied for it to function properly as a terminator. The HYC9088 (HIT) maintains a high impedance whether power is applied or not. This allows a HIT to be placed anywhere on the cable. When a HIT and a 93Ω resistor are connected to the end of a cable, it is the resistor which provides the actual termination. To summarize, with power applied, there is no difference between a LAND and a HIT with a 93Ω resistor. With power removed, a LAND will lose its terminating property while the HIT with a 93Ω resistor will maintain its terminating property.

3. Can a HIT be connected to a Passive Hub?

   No. Due to their heavy load and short cable length restrictions, the use of Passive Hubs with HITS is not allowed.

4. Can a HIT be used to directly drive Twisted Pair cable?

   Yes. The HYC9088 may directly drive either coaxial or twisted pair cable in a Bus topology.